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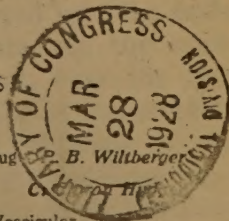
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THE BIOLOGIST

THE OFFICIAL ORGAN OF THE PHI SIGMA HONORARY
BIOLOGICAL SOCIETY

VOL. 1.

COLUMBUS, OHIO, MAY 1916

No. 1.

ORIGINAL ARTICLES

A note on The Anatomy and Biomonics of the Bedbug
(*Cimex lectularis* Linnaeus.)

P. B. Wiltberger

(Department of Zoology and Entymology.)

(The Ohio State University.)

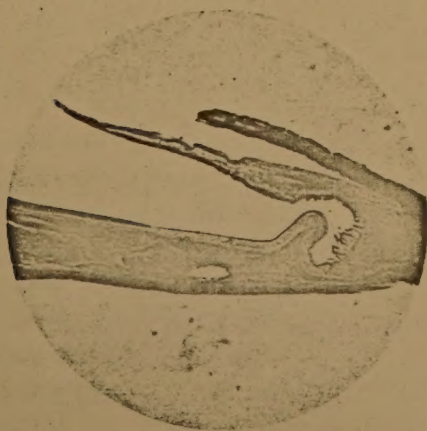
Most of the Heteroptera, in mating, assume a position with the caudal extremities in apposition. This, however, is not the case in the common bedbug. In this species, the male assumes a diagonal position across the dorsum of the female, and the male genitalia are inserted into the orifice of the Organ of Berlese which is located on the caudal border of the fourth abdominal segment, near the right side. The organ is merely an invagination of the ectoderm and is homologous with the ectodermal infoldings of each segment. However, sections showing the true nature of this organ have never been figured in any of the literature on the bedbug. Patton and Craig (1913) figure a cross section of it but this figure does not compare at all with the sections which the writer has obtained (1916.) (See figure.)

The organ is lined with a delicate coat of chitin which is produced in folds or rods. The function of these

is doubtful; they may be sensory. The hypodermal wall is rather thick and the cells seem to be broken down as if cytolysis had taken place,—probably with the passage of spermatozoa thru them. There is absolutely no connection between the Organ of Berlese and any other organ in the body. Nevertheless, the spermatozoa enter here and pass thru the wall of the organ, as determined by dissections in physiological salt solution, into the haemocoel, thence thru the walls of the oviducts. The fact that the fertile eggs are laid in the ordinary manner, by way of the vagina, proves this assumption.

This method of entrance of the spermatozoa thru the body wall is the only case of its kind to be found in any Phylum above the Trochelminthes, where the same condition occurs in a few species.

Thus we have here, a reversion to, or a retention of a very primitive method of copulation and fertilization by the common bedbug, which insect is, in itself, considered to be a most highly specialized form of the more specialized sub-order of the Hemiptera, namely, the Heteroptera.



CROSS SECTION OF THE ORGAN
OF BERLESE

Photomicrography.

C. Claron Hugger,

Assistant in Pathology, The Ohio State University.

In this paper, I wish to emphasize the value of photomicrography as a method of illustration and record, to those who are working in the various fields of biologic sciences. It is evident that this method has not been fully appreciated. The pen sketch is still used almost exclusively in certain fields. This method is costly, both from the standpoint of labor and time and, at times, that of accuracy of record. The time consumed in the production of these sketches is necessarily great. The use of the photomicrograph would lessen this decidedly.

The degree of skill required to make good photomicrographs is not excessive and is easily within the reach of every fairly intelligent technician who possesses the fundamentals of photography. With this knowledge, the combining of a light, a microscope, and a camera should not be difficult.

The field to be photographed is placed in position, and focussed on the ground glass screen of the camera as sharply as the specimen will permit. A ray filter is interposed between the substage and the light. This is done to filter out objectionable rays of light and also to amplify the chromatism of certain parts of the object and reduce the remainder. A filter of the complementary color is used to amplify and one of the same color to reduce the chromatism of the object.

The exposure is now made. Its length depends on various factors; the amount of illumination, the magnification of the optical system—high powers requiring greater exposure than low ones—, the character of the object, the filtering power of the filter, and its influence on the sensitiveness of the plate to the color being photographed. In this way, an accurate record of the preparation is obtained, free from personal interpretation. The accompanying cuts

were produced by an arc light requiring about five amperes of current.

With only a moderate amount of skill, gratifying results can be obtained. The specimens must be stained sharply, cleared well, mounted neatly; specks of dirt on the cover glass, the slide, or in the balsam will give a specked negative. Bugs insects, etc., of any appreciable thickness, should be mounted in the center of a ring cell of corresponding thickness. This should be done to prevent tilting of the cover glass and a loss of the mounting media during exposure.

From such records lantern slides can easily be prepared. These, of course, prove very servicable in class room lectures. Advantage may also be taken of this method to dispense with drawing in certain of the sciences. Where it is desirable to train the powers of observation, sketching is the method par excellent. On the other hand, in certain subjects, such as pathology, it is of more importance to leave with the student a mental picture of a process, which can only be done by tracing the development of the disease thru a great number of sections. Each section must be studied with a minimum loss of time. The Department of Pathology of The Ohio State University has found that the efficiency of its students can be increased about 60% by the introduction of Photomicrographs in place of sketch making.

Summary.

Photomicrography is not a difficult process. It affords an inexpensive and accurate method of recording original observation. It affords an excellent and easy method of illustrating lectures. Furthermore, in certain sciences, it can replace the drawings in the laboratory manuals with decided profit to the student.

Photographic Legends.

1. Ventral aspect of *Cimex Lectularis* Linnaeus with eggs in oviducts (Legs and antennae removed.) Cleared specimen. 32 mm. Microtessar lens. Screen 5800. Exposure 2 min. Camera bellows 21 cm. Seed No. 23 plates.

2. Eggs in oviduct of No. 1. Segmentation of embryo. Obj. 16mm. Compensating ocular No. 2. Screen 5800. Exposure 3 min. Camera bellows 21 cm. Seed No. 23 plates.

3. Nymphal exuviae of 1" and 2" instar. Photographic technique, same as in Fig. 1.

4. Tubules and glomerulus of normal kidney. Obj. 1.9 mm. Ocular No. 5. Screen 5800. Exposure 4.5 min. Camera bellows 10.7 cm. Seed No. 23 plates.



FIGURE ONE



FIGURE THREE



FIGURE TWO



FIGURE FOUR

Studies of Respiratory Sounds.

The Causes of The Vescicular Murmur.

Preliminary Report.

R. L. Mundhenk and C. I. Reed.

(From the Department of Physiology, The Ohio State University.)

On account of conflicting statements of various authors as to the cause of the vescicular sound in normal respiration, experiments have been performed with a view to determining more accurately, the factors involved in the production of this phenomenon.

The vescicular murmur is heard during normal inspiration on applying the ear or a stethoscope to the thoracic wall and has been described as resembling a whispered hah.

One group of authors has held that the vescicular sound is produced, in part, by the sudden dilatation of the collapsed air vescicles of the lung by the sudden inrush of air during inspiration, and, in part, by the passage of air from the narrow terminal bronchioles into the wider infundibuli. (Starling, Flint.)

A second group holds that the vescicular sound is the result of transmission of bronchial sounds downward thru the air columns in the bronchi, and into the terminal tubules. (Pembrey.)

Still others insist that the vescicular sound is produced in the larynx and transmitted by the columns of air passages here it is modified in such a way by its passage thru the substance of the lung as to give the characteristic whispered murmur heard over the surface of the thorax. (Kirk, Halliburton, Stewart, Bainbridge and Menzies.)

With these conflicting claims in mind, a number of preliminary experiments were undertaken, an account of which follows:

Ex. 1. 20 year old mare; wt. 454.5 K., respiration 16,

pulse 40, Temperature 100.2°. The vesicular sounds were normal, both before and after anaesthesia. Under complete chloral hydrate anaesthesia, the trachea was exposed and cut between the fifth and sixth rings. The vesicular sounds were very noticeably modified in intensity. When the cut ends of the trachea were approximated by means of sutures, the sound became normal again.

Ex. 2. 18 year old gelding; wt. 409 K.; respiration 18; pulse 44; tem. 101°. The vesicular sounds were normal. Complete chloral hydrate anaesthesia. Sounds still normal. The trachea was incised between the sixth and seventh rings and a large tracheotomy tube inserted. The sound became bronchial in type. The cut ends of the trachea were approximated with the result that the sound again became normal. The trachea was then cut between the eighth and ninth rings with results similar to those obtained in the first operation, except that the intensity of the bronchial sound was still further diminished.

Ex. 3. Middle-aged, male dog; wt. 14.5 K.

11:00 A. M. Respiration 18; pulse 124. Vesicular sounds normal and easily distinguishable. Administered 3 gm. per kilo of urethane by stomach.

11:30. Anaesthesia complete. Respiration 28; pulse 160. Normal vesicular sounds. Removal of the skin from the thoracic wall increased the intensity of the respiratory sounds. Removal of the superficial muscles further intensified the sounds.

A large, soft, rubber tube was inserted into the trachea, thru the mouth, the length of the tube from the teeth being 32 cm. A stenotic sound was heard, probably caused by the rush of air from the end of the tube past the bifurcation of the trachea.

The tube was then withdrawn until there was almost complete absence of any sound. It was subsequently determined that the end of the tube extended to a point 15

tracheal rings or 7.5 cm. cephalad to the bifurcation of the trachea.

The tube was then withdrawn completely and the trachea cut between the second and third rings and lifted from the surrounding tissues, with the result that the intensity of the sounds was reduced to such a degree as to render them inaudible. When the several sections of the trachea were brot together by means of sutures, normal sounds were again heard.

12.30 P. M. The ventral thoracic wall was removed and artificial respiration was kept up at a normal rate and amplitude. There was no change in the heart rate. A stethoscope with the surface oiled to prevent friction sounds was applied to the surface of the lungs in different regions. No vesicular sounds were audible during quiet, regular, artificial respiration.

Ex. 4. Middle-aged, male dog; wt. 20 K.

3:00. Respiration 20; pulse 124. Normal vesicular sounds. Administered 3 gm. per kilo of urethane by stomach.

3:30. Complete anaesthesia. Normal vesicular sounds. Operations were carried out as in the previous experiment with closely comparable results.

These experiments indicate that the most important factor in the production of the vesicular murmur lies in the pharynx and upper air passages. The tube inserted into the trachea would tend to reduce to a minimum the friction of the air with the respiratory passages. Severance of the trachea would remove, to a large degree, the structures which tend to produce friction in this region.

However, no definite conclusions can be drawn from the data already secured. Further experiments will be necessary to confirm or disprove any theories regarding the cause of the vesicular murmur. Such experiments will be carried out as opportunity affords.

Bibliography.

Bainbridge and Menzies. Essentials of Physiology. 1914. p. 249.

Flint. Handbook of Physiology. 1905, p. 109.

Halliburton. Handbook of Physiology. 12" edition, 1915, p. 358.

Kirke. Handbook of Physiology. 17" edition, 1902, p. 267.

Pembrey. Practical Physiology. 3" edition, 1910, p. 176.

Starling. Principles of Human Physiology. 2" edition, 1915, p. 1045.

Stewart Manual of Physiology. 7" edition, 1914, p. 230.

Tigerstadt. Human Physiology. 3" edition, 1910, p. 322.

A Study of The Common Dandelion.

Paul B. Sears.

(Department of Botany, The Ohio State University.)

European botanists since 1903, have been familiar with the fact that the common dandelion, *Taraxacum vulgare*, reproduces parthenogenetically, forming an embryo from an egg cell without sexual fusion.

In plants normally sexual, the pollen grains, from which the male group of cells arises, are formed in groups of fours by reduction divisions, as are the megaspores, from which the female group, and hence the egg, arises. This means that the egg and sperm, being derived directly from cells formed by reduction division, have the half-normal nuclear content, which is restored to the normal by sexual fusion.

Now in the dandelion, the cells which may give rise to the female group are formed in pairs, instead of fours, and have the unreduced nuclear content, and the egg requires no sexual fusion before forming an embryo.

During two years of careful work, the above well-known facts were fully confirmed. No suggestion of any sexual fusion has been found, nor has any sign of pollen germination been observed in examining a great number of preparations.

Much of this pollen, tho functionless, is formed in fours, by regular reduction division, as indicated in the top row of the accompanying plate. Much also is formed, as shown in the next row down, by irregular divisions resulting in two normally-sized grains, and two, or more, dwarfed grains. Finally, in the red-seeded form of our common dandelion, generally known as *Taraxicum erythrospermum*, it is not uncommon to find the pollen cells formed in pairs and having the normal or unreduced nuclear content, just as the cells which give rise to the parthenogenetic egg.

The lower half of the plate accompanying shows certain interesting details which serve to explain some of the irregularities noted in pollen development. On the left are two figures of irregular first divisions of pollen mother cells, the first showing what is probably a clear case of division by simple pinching apart, and the second showing a delayed type of division, in which some of the chromosomes fail to get into the daughter cells at the poles, and so form one or more extra nuclei by themselves.

On the right side of this lower half of the plate are three figures, the upper showing probable, but not proven, case of division by pinching apart of nuclear masses. The middle figure shows two small supernumerary nuclei organized from stray chromosomes left behind in delayed first mitosis. In the bottom figure, we have a series showing the extrusion of stainable material from the nuclei of two normal-sized daughter cells and the organization of this stainable material into small supernumerary nuclei.

The foregoing paragraphs and the simple figures which

DEVELOPMENT OF POLLEN

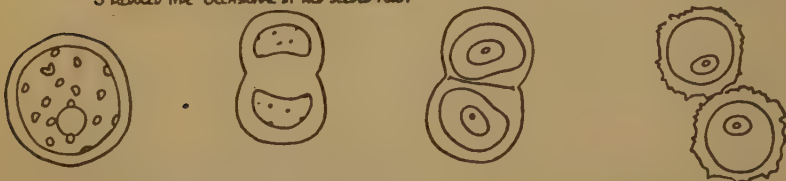
1 NORMAL TYPE FOUND IN SEVERAL SPECIES NOT UNCOMMON IN T. VULGARE



2 INTERMEDIATE TYPE COMMON IN T. VULGARE

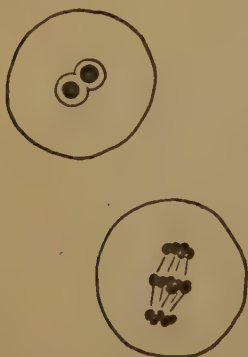


3 REDUCED TYPE OCCASIONAL IN RED SEEDED FORM

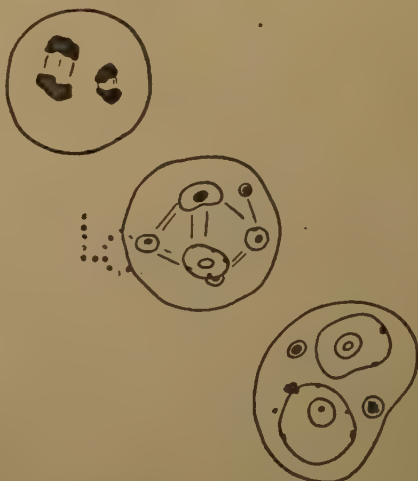


DETAILS OF POLLEN ABNORMALITIES IN T. VULGARE

1 IN FIRST DIVISION OF MOTHER-CELL



2 IN FINAL DIVISION



accompany them are offered simply as statements of what has been found, not as proof, for convincing proof is impossible in this compass. and must await later, more detailed presentation.

What The Faculty Men Say.

As Dean of the Graduate School, it is hardly necessary for me to say that I am heartily in accord with the formation of any society in the University that has for its object the encouragement of research work; for the graduate school and research work are indissolubly linked together. No university can be true to its name unless it fosters research work in every possible way.

President Butler, in his report as President of Columbia University for the year 1914-15, makes the following statement: "As the University grows and extends its activities and its service to the public is richly multiplied, it is of vital importance that it lay increasing and steadily increasing emphasis upon the work of research.—To organize and to stimulate research is the university's chief business."

Every organization that has at heart the encouragement of research work is assisting the university in fulfilling its function and, as such, should be welcome.

William McPherson,
Dean of Graduate School.

Ideals of an Honor Society.

It is hardly necessary to say that a society must be what its members make it, but what it is may depend greatly upon what its members conceive its mission and purpose to be. It seems to me that one of the fundamental purposes of an honor biological society must be to encourage and stimulate accurate and honest work in these sciences. It would, of course, be paradoxical for an honor

society to stand for anything less than honorable work but it may be worth while to emphasize the idea that this means an attitude of honesty in all phases of ones study. It should be appreciated that it is not only dishonorable but fundamentally unscientific to tolerate anything but strict integrity in scientific study of research. I should be glad to see a society which should have as its standard such a high ideal of character in scientific work rather than one of brilliance in achievement. The progress of biology is more dependent upon careful, exact additions to knowledge than upon occasional brilliant discoveries. The student who is habitually accurate in his work and possesses a fine sense of honor is well worth the encouragement that association and cooperation with other students in his field may offer.

Herbert Osborn,
Professor of Zoology.

EDITORIALS

Historical.

Early in the school year of 1914-15, at The Ohio State University, two separate groups of students in biological departments, realizing the advantages to be derived from more extended intercourse with students in others of the fundamental biologic sciences, began independent agitation for the purpose of forming an honorary society to which students specializing in biological work might be admitted. Upon discovering the common purpose toward which each was striving, these two groups subsequently succeeded in uniting their forces and after considerable discussion and several informal meetings, eleven students, representing various departments of biological science met on the evening of March 17, 1915, in the Ohio Union and officially organized the Phi Sigma Honorary Biological Society.

Another charter member was subsequently added to this number.

Mr. Eric Cogan, graduate student in entymology was unanimously elected president of the organization. Official sanction was soon granted by the University Faculty and from the beginning, the society enjoyed the hearty support and co-operation of many of the faculty members in biological departments.

It was by the advice of these same faculty members that the decision was finally made to keep all actual control of the organization in the hands of the students themselves in order that there might be the added stimulus of responsibility for its progress. Progress has been rapid and new members have been added from time to time.

Realizing from the first that the benefits to be derived from such an organization could be enlarged proportionately by uniting the efforts of this with similar organizations in other schools, the society has taken active steps toward nationalization and with this end in view, it was decided that the best means of proving its sincerity of purpose would be the publication of a magazine.

The Alpha Chapter of the Phi Sigma, therefore, presents for the consideration of its readers this initial effort in the literary field. Being well aware of the shortcomings of the product, we do not apologize for anything that may seem inadequate, but we do express the earnest and sincere hope that this represents the poorest product of the hopes and aims of the Society and that in future there will be marked progress as we live and learn.

One of the most prominent features in the make-up of this organization is the purpose to stimulate and aid members to greater productiveness and not merely to accord recognition for past accomplishments, which last is the predominant feature in many other honorary societies. In order to accomplish the full realization of the ideals of the organization, every member should be an active and productive worker in some line of biological science. It is not

sufficient merely to fulfill the scholarship requirements specified in the constitution and to accept the honor key. Those manifestations should be only incidental to the real purpose of the Society.

C. I. Reed.

New Chapter Established.

On the evening of May 10, 1916, the Grand President presented to Alpha Chapter, sitting in regular session, a petition for membership accompanied with full credentials, from the Natural Science Club of the University of Michigan, asking recognition as a chapter of Phi Sigma. There was a brief consideration and discussion of the personnel of the new group, but, since many of the members already knew of the existence and activities of this organization, the consideration was brief and the petition was formally accepted. The Beta Chapter of Phi Sigma will be installed as soon as arrangements can be made to the satisfaction of all concerned.

This society was first organized in 1913, under the name of the Zoological Assistant's Club, with a charter membership of ten. Since that time the society has progressed and shown a real wide-awake interest in biological affairs.

We are glad to welcome this new group into membership. We recognize that they have shown a true spirit of scientific investigation. We also appreciate the sacrifice they have made in asking for membership in a society which has been in existence but little more than a year, and so not so old or so far developed as theirs. We appreciate greatly the interest they have shown in Phi Sigma and the realization of the possibilities of such an organization. With two such chapters in schools like Michigan and Ohio State, there should be no fears as to the future progress of Phi Sigma.

Beta Chapter has a charter membership of sixteen

men representing the departments of zoology, botany and forestry. Of this number, five already have degrees, two are candidates for degrees and the remainder are undergraduates. Six of these men have already published one or more original papers on research work and five now have special problems under consideration.

This speaks well for the personnel of the new chapter, for it indicates an active interest in productive work in biological sciences. In our next issue, we hope to be able to give further proof of their fitness in this work.

Why Phi Sigma?

All organizations have some definite purpose as a basis for their existence. Most of them are essentially constructive, but unfortunately many such organizations eventually diverge from this path and assume the course of least resistance and take on a nominal entity only.

An organization which is dedicated to promote the welfare of any phase of human endeavor should not slack up in its efforts until the goal has been reached.

With this idea in view, the Phi Sigma Society was organized to carry on an active program along the lines of natural sciences. The propaganda to be carried out by the students during their student days, so that they may equip themselves for the harder tasks ahead of them.

What should constitute a constructive program for the Phi Sigma and what possible benefits may be derived from it?

This may be easily answered. The organization may do a great deal of creditable work by inviting the most promising students into its membership, by meeting weekly or bi-weekly and discussing original papers, reviewing the current literature in biologic fields, interchanging ideas relating to the work of the various departments, etc.

This sort of program would keep a man informed along

the various phases of biological progress and the allied sciences,

Yes, this should also impose obligations upon a man. It should develop the individual in public speaking, which is so vital to the success of any man, it should place him upon his own resources and inspire him towards original work.

There is no doubt, that, coming into intimate contact with other representative men who share common interests serves as a great stimulus. It is a college education in itself.

Max Wershow.

Looking Forward.

While we are making our initial bow to the readers of The Biologist, a word in regard to contributions to future numbers seems to be in order. The whole editorial policy might, in fact be summed up in the single word, "Encouragement," because it is from those who are just starting out in their various fields of endeavor that we hope to draw the greatest number of our published manuscripts. This plan is quite in harmony with the purpose of Phi Sigma, namely, to be of aid to those actively engaged in research work. Those of our co-workers who have already distinguished themselves will find no difficulty in the preparation which scientific journals already widely known would be glad to publish. But most of us are timid about starting a paper and even after it is started, we are inclined to let it go for fear it might, somehow, get into print.

Right here among our own folks, however, we have no reason to be embarrassed or overconscious of individual limitations. We can stand up and speak our minds and not be afraid. It is like the first trip to the old swimming hole in the early spring. We are almost tempted to say, "The last feller in knows what he is."

Just because we are willing to publish first papers,

whose authors are just getting their stride does not mean that we must, or are going to sacrifice one whit, the quality of our articles. That must always be up to standard. Lots of work which represents hours of careful and patient labor on the part of the investigator, often falls by the wayside because of lack of confidence on his part and because of the bugbear of writing,— to many, a tremendous thing. I happen just to run across some entries in Darwin's diary that show how hard it was for him to record the results of his experiments and speculations. In 1874, when he was sixty-five years old and had published the "Origin of Species" fifteen years previously, and the first edition of the "Descent of Man" three years previously, he wrote, "The new edition of the "Descent" has turned out an awful job. It took me ten days merely to glance over letters and reviews with criticisms and new facts. It is a devil of a job." The next year, a paper he had formerly read before the Linnean Society was published as a separate book. Again he showed that manuscript preparation was, even with his large experience, unwelcome labor and he voiced his opinion by saying, "I begin to think that every one who publishes a book is a fool."

A thot devoted to considering the difficulties which beset this great worker is stimulating. We can struggle thru our own troubles with a lighter heart and greater willingness to attack the matter at hand.

A. E. Waller.

Alumni News.

W. C. Lane, B. Sc. in Agr. '15, is instructor in zoology in the University of Maine at Orono.

A. R. Shadle, M. A. '15, is instructor in zoology in Cornell University.

G. E. Springer, D. V. M. '15, is practicing veterinary medicine at Ashtabula, O.

